EPA Comments on the Draft Final Phase I RFI/RI Workplan for Operable Unit 4, the Solar Ponds

General Comments

It is not evident that there is any connection between previous characterization data and information for the solar ponds, and the design of the new phase I FSP. EPA recommends taking an additional look at the existing characterization information between now and the time of commencing field activities in order to identify changes in the proposed activities and approaches to be conducted during this phase I field investigation. If it is determined that changes to the FSP are necessary, then DOE should submit a Technical Memorandum for EPA's and CDH's approval.

The FSP, in general, is comprehensive and addresses all the investigation activities that need to be performed to characterize the solar ponds and the ITS area. However, there are areas in the FSP that need clarification and justification or rationale for the approaches to be taken when conducting field activities.

EPA is concerned that the soil surface sampling approach proposed in this workplan may not be adequate to characterize soil surface contamination. EPA prefers that a subset of the proposed sampling locations be correlated to those locations exhibiting the highest count levels in the radiological survey in order to establish accuracy and quality control (QC) for analytical results. A separate subset of surficial sampling locations should be randomly chosen to determine confidence levels which may then be used to establish the utility of radiological surveys. With this approach, the possibility of missing a contaminated surface area would be minimized.

In addition, EPA has concerns with some of the field protocols presented in this FSP. First, EPA does not feel comfortable with the proposed surface soil collection method. EPA prefers that the CDH surface soil collection method be used instead, since it is the preferred method for collection of surface soil samples for radionuclide analysis. Second, the protocol for using the Ludlum Model 12-1A alpha monitor included in the FSP is inadequate. SOP FO 1.16 establishes that the Ludlum Model 12-1A alpha monitor must held parallel to and within one quarter inch of the surface being screened rather than 4 to 6 inches off ground surface as stated in the FSP. DOE must follow and be consistent with the protocols described in the SOPs or justify why a different method or protocol is needed.

Also, EPA suggests that the FSP include the contingency to collect ground water samples from boreholes where saturated conditions are encountered so as to provide preliminary analytical data on ground water. One approach would include the installation of a temporary casing in boreholes and subsequent conversion of these boreholes into ground water monitoring wells. This approach would also allow ground water levels to equilibrate to natural levels prior to installation of monitoring wells, particularly in low-permeability formations. In addition, EPA recommends that the FSP take into account alternative field methodologies that may enhance the objectives of each investigation and promote efficiency in the overall field program.

This workplan needs to explain how the risk assessment and environmental evaluation processes, and the phase I/phase II scheme set up in the IAG fit together. While all field activities should be designed and conducted to support completion of a risk assessment and environmental evaluation impacts, this phase I effort is restricted to source definition in support of closure. The information obtained will be utilized in assessing risk from this OU, but may not be sufficient to conclude that task nor to conduct environmental evaluations. Some exposure pathways may not be ready for full evaluation until after phase II when characterization information on other transport media such as ground water, surface water, air and biota is gathered.

In addition, the BRA presented in this workplan consists of a generic guidance or approach to be followed when evaluating the potential human risks and environmental impacts associated with a given site. Site-specific conditions are not discussed in detail nor are methods provided for dealing with site-specific conditions. The BRA needs to be revised to consider and discuss site-specific conditions and applicable approaches.

Specific Comments

Section 1.3.3.8, Hydrology, page 1-13. The text states that the hydraulic conductivity of the Rocky Flats Alluvium and the Arapahoe No. 1 Sandstone is approximately 6×10^{-5} centimeters per second (cm/s). Although the upper hydrostratigraphic unit consists of both the alluvial unit and the Arapahoe No. 1 Sandstone, apparently separate values of hydraulic conductivity have been measured for each member of this unit. Table 2.1 indicates hydraulic conductivity ranging from 1×10^{-2} to 4×10^{-8} cm/s for the Rocky Flats Alluvium. It also presents a combined measurement of the Rocky Flats Alluvium and the Arapahoe No. 1 Sandstone, 6×10^{-5} cm/s. The method(s) or assumption(s) in deriving this combined measurement of hydraulic conductivity should be explained. The text should also clarify the distinction between these lithologic units and provide ranges of values for measurements of hydraulic conductivity for members within the upper hydrostratigraphic unit, if applicable.

Section 2.3, Previous Investigations, page 2-10. Although a report is not available summarizing the 1989 soil sampling program at the solar ponds, Appendix E provides 1989 soil analytical results. The text should reference Appendix E accordingly.

Section 2.4.2.1, Ground water, page 2-17. Out of the 40 borehole logs included in Appendix B, well completion records for only eight monitoring wells are included in this appendix. The text should be clarified to indicate which information is presented in Appendix B. Additionaly, well completion records and construction details should be provided for all alluvial or bedrock monitoring wells depicted in Figure 2-15 and those included in the 1989 drilling program. Construction details, tabulated in Table 2.4, are not provided for all monitoring wells depicted in Figure 2-15. This section needs to state if these construction details are unavailable or why they are not being provided.

Similarly, ground water data included in Appendix F correspond to only 20 of the borehole logs included in Appendix B. It also includes data from three monitoring wells apparently included in the 1989 drilling program (P209189, P210189, and P20889), which were not included in Appendix B. A summary of previous field programs, similar to that described on page 2-28 (Section 2.5.2) for soils, is required in Section 2.4.2 for ground water. EPA suggested that a tabular format depicting the previous characterization programs and the associated soil borings or monitoring wells be included in the phase I RI report.

Section 2.4.2.1, Lower Hydrostratigraphic (Confined) Unit, page 2-19. The discussion of anomalous water levels in bedrock well 2786 requires further explanation. Additional water level readings similar to the May 1990 levels are shown in appendix C, particularly in October 1986, and intermittently thereafter. In fact, several 40 to 50 foot water level variations have occurred in this well. It is evident that there exists some problems with this bedrock well. DOE should reevaluate the usability of this bedrock well and may be consider it for abandoment.

Table 2-4, second page. Well number B310489 is indicated on this table. It appears that this well should be B210489, as no other references to B310489 have been located.

Figure 2-30. EPA suggests that this conceptual model defines what constitutes a phase I and a phase II conceptual model. This will help to evaluate whether the activities proposed during this phase I investigations are adequate to support the phase I BRA.

Soils can serve as a source of contamination, as well as a transport medium. This conceptual model needs to account for soils as a potential source of contamination.

In addition, it is not clear whether this conceptual model accounts for ground water which is not collected in the ITS and is flowing downgradient. This conceptual model needs to provide an optional pathway for ground water not being collected by the ITS even though this may be a minor component of ground water flow.

Section 3.0, Applicable or Relevant and Appropriate Requirements. DOE is in the process of preparing a site-wide document defining all potential ARARs. EPA reserves the right to comment on this section until the draft document of potential site-wide ARARs is completed and submitted to the regulatory agencies.

Section 4.1.3, Develop Conceptual Model, page 4-4. This section needs to address ground water flowing downgradient beyond the ITS.

Section 5.3.6, Interceptor Trench System and Remainder of Site, page 5-4. It is not clear whether geophysical surveys are to be conducted in the ITS area. Section 4.2.3, page 4-7, mentions that geophysical surveys will be conducted in areas of the ITS. However, this section does not include geophysical surveys as part of the investigation tasks for the ITS. This needs to be clarified.

Section 5.6, Phase I Baseline Risk Assessment, page 5-6. This section explains that the BRA for phase I is going to be performed at the source/soils of contamination. However, the BRA information included in sections 8 and 9 of this workplan does not differentiate between the two phases. Instead, the BRA consists of an overall generic plan to be use in evaluating human health risk and environmental impacts posed by the site. This section needs to explain this discrepancy.

Section 7.1, Characterize Original and Existing Solar Ponds, Objective 4, page 7-2. The presence of perched water should be considered when conducting vadose zone investigations.

Section 7.2, Background and Field Sampling Plan Rationale, page 7-3. The usefulness of geophysics investigations proposed in the area of the ITS needs to be justified and explained.

Section 7.2, Sampling Plan Rationale, page 7-4 and 7-5. This section states that a subset of previous radiological survey points will be selected for surficial sampling and laboratory analysis (page 7-4). It is not clear what radiological survey points this section is referring to. This needs to be clarified.

Ground penetrating radar is often found to be inefficient in providing an accurate lithology of the subsurface. If this turns out to be the case, then other techniques need to be considered.

Therefore, this workplan needs to identify and describe other available techniques that may provide better information on the profile of the subsurface. See comment on Section 7.3.4.1.

Vadose zone monitoring should be consistent with the sophisticated vadose zone monitoring program currently being developed at Rocky Flats Plant.

The use of ground water tracers should also be considered in the area of the ITS, as discussed in Section 7.3.6.2. Tracer studies would provide information on flow paths and travel times.

<u>Section 7.2, Analytical Methods Rationale, page 7-6.</u> The text should state that changes to the analytical suite are contingent upon EPA and CDH approval.

<u>Section 7.3.2, Site-wide Radiological Survey and Surficial Sampling Program, page 7-8.</u> This sections mentions that the Ludlum Model 12-1A alpha monitor will be held 4 to 6 inches off ground surface. This is inconsistent with SOP FO 1.16 which establishes that alpha monitors must be held parallel to and within one quarter inch of the surface being screened. This needs to be corrected. In addition, the gamma survey should also provide the option of using a collimator to shield gamma radiation from external influences and to better define elevated readings at the survey nodes.

This section proposes 35 surface soil sample locations which are to be selected at random. These surface soil sampling locations should all not be randomly chosen, but a subset of these locations should be correlated to those locations exhibiting highest count levels in the radiological survey. For example, 10 sampling locations can be located on hot spots identified during the radiological survey and the remaining 25 sampling locations can be selected at random. This will provide a better profile of surface soil contamination and will minimize to an extent the possibility of missing a contaminated surface area.

In addition, the CDH surface soil collection method described in SOP GT 8 is the preferred method for collection of surface soil samples for radionuclide analysis. This section needs to justify why the surface soil collection method described in this section is to be used instead.

<u>Section 7.3.3, Site-wide Vadose Zone Monitoring, page 7-10.</u> The use of the BAT system for vadose zone monitoring should be investigated more thoroughly because it may not be appropriate where soil moisture has not already been determined or encountered. The BAT system is designed to instantaneously collect a water or gas sample from specific depths; however, unlike a lysimeter, it will not maintain a pressure differential

between the sample vessel and the surrounding environment.

Section 7.3.4, Original Pond Area, page 7-10. Figure 7-2 shows an approximate location of the original pond. In this figure a portion of the original pond is shown to be beneath a building. The building may present some difficulties when delineating the perimeter of the original pond. This workplan needs to explain what is to be done to solve this problem.

Section 7.3.4.1, Geophysical Investigation, page 7-11. The GPR investigation may provide useful subsurface information, but only relative shallow depths depending on the radar frequency employed. It is an excellent tool for the clearing boreholes of potential obstructions to depths of approximately 10 feet, but the resolution below these depths may be quite variable. It is particularly useful in identifying shallow pipelines, which exhibit distinct signals; however, the reflection of the signals across the soil horizons or boundaries may be much less distinct. Other techniques may need to be evaluated to determine the lithology of the subsurface.

Section 7.3.4.2, Unconsolidated Materials Investigation, page 7-13. The workplan should include the contingency to collect ground water samples from boreholes where saturated conditions are encountered. One approach would include the installation of a temporary casing in boreholes and subsequent conversion of these boreholes into ground water monitoring wells. This approach would also allow ground water levels to equilibrate to natural levels prior to installation of monitoring wells, particularly in low-permeability formations.

Alternatively, in situ methods of collecting perched water or ground water from boreholes should be included as contingency. These methods include a BAT system, temporary well points, or HydroPunch sampling methods.

Section 7.3.5.3, Unconsolidated Material Investigation, page 7-16. This section mentions that 10 perimeter borings will be placed on the pond exteriors. This appears to be incorrect. Seventeen borings are proposed within the existing ponds, leaving only 9 borings (of the 26 total) for the exterior portions of the ponds. In addition, Figure 7-4 shows only 9 perimeter borings. This needs to be corrected.

This section also mentions that a subset of the proposed borings in the solar pond area are to be advanced deeper than is described in standard drilling and sample collection procedures in order to collect geologic information on bedrock structures and stratigraphy underlying the ponds. If this is done, there exist possibilities of encountering ground water. If this is the case, it would be wise to convert these borings into monitoring wells to be used during phase II field investigations. This would provide preliminary analytical information in ground water to be used when designing the FSP for phase II investigations.

The pond perimeter borings around the embankments could be angle-drilled if an accessibility problem exists, or if the characterization of materials beneath existing or former pond embankments is deemed necessary.

Boreholes within the solar ponds area advanced into bedrock with coring methods will require the installation of surface casing if perched ground water or the water table are encountered. DOE should follow procedure for installation of surface casing included in OU 2 Bedrock Workplan. The surface casing, grouted into place, will prevent the downward migration of alluvial runoff (surface water) and potential contamination of bedrock, and possibly the unconfined water table.

Additionally, the workplan should describe geotechnical analyses that may be performed on bedrock core samples. If geotechnical analyses are not proposed, the workplan should explicitly state that only visual determination will be used to identify bedrock structures, stratigraphy, fracture patterns, or other information.

<u>Section 7.3.6, Interceptor Trench System and Remainder of the Site, page 7-17.</u> It is unclear how cone penetrometer data will aid in the evaluation of the ITS. The cone penetrometer will provide inferred lithologic data based on penetration resistance of the cone penetrometer probe.

<u>Section 7.3.6.1, Unconsolidated Materials Investigations, page 7-17 and 7-18.</u> Figure 7-5 shows 19 boreholes in the ITS area and remainder of the site instead of 17 boreholes as mentioned in this section. In addition, this section mentions that 9 boreholes will be placed in the ITS area. It is not clear which boreholes this section is referring to and consequently it is not possible to locate them. This needs to be clarified.

Also, it would be wise to convert those boreholes to be drill into bedrock into monitoring wells.

When collecting soil samples targeted at the capillary fringe, it may be difficult to distinguish saturated properties of the soil or unconsolidated materials. It is difficult to target the capillary fringe with continuous sampling techniques, particularly in low-permeability formations, without first establishing the depth of the water table. It is not uncommon when encountering saturated conditions in low permeability formations to allow the borehole to stabilize for several hours, and sometimes days, to establish the equilibrated or true water table depth.

It is also difficult to distinguish perched water zones as compared to the actual water table during continuous sampling. Indeed, it is possible to drill or sample completely through the perched water without recognizing it as such.

The workplan should describe how these or other contingent situations will be approached while continuously sampling through unconsolidated materials and targeting the capillary fringe or water table throughout the total borehole depth.

Section 7.3.6.2, Piezometer Installation, page 7-18. It is not clear how analytical modeling of aquifer drawdown to estimate the area of influence within the ITS will be conducted. The model assumptions should be defined and stated in the text. Additionally, the model will require calibration to existing field conditions. Currently, it is anticipated that more relevant data may be obtained from measurement of hydraulic parameters from the existing system prior to computer modeling. In addition, the use of hydrologic data from existing monitoring wells within the vicinity of the ITS during system operation may provide preliminary information useful in establishing piezometer spacing, depth, or configuration.

This section mentions that three piezometers are to be installed in the ITS parallel to the assumed ground water flow. Figure 7-5 shows only 2 piezometers parallel to the assumed ground water flow. This discrepancy needs to be corrected.

In addition, the proposed locations are shown only within the eastern portion of the ITS. To determine the effectiveness of the entire system, piezometers may also be necessary near the central and western portions of the ITS. The uniformity of geologic or hydrologic conditions may also dictate the distribution of piezometers throughout the ITS.

Section 7.6, Field QC Procedures, page 7-22. This section needs to include a discussion on the use of field blanks and laboratory blanks. These blanks in conjunction with trip blanks will determine or establish where contamination may have occurred.

Section 8.1, Overview, page 8-1. Figure 8-1 illustrates a generic Human Health Risk Assessment process and components. While this figure contains all the necessary components to perform a risk assessment, this figure needs to illustrate site specific components associated with the nature of contamination and physical conditions of the solar ponds. In addition, it is suggested that these figures show what activities are going to be considered during phase I and phase II investigations.

Section 8.3.4, Potential receptors, page 8-9. The text states, "the exact exposure scenarios to be completed will be selected according to an assessment of future use...of the site that may be made prior to completion of the Human Health Risk Assessment." However, there is no discussion of how future use will be assessed and the risk assessment cannot be completed prior to this assessment. A precise description of exposure assessment approaches and actions is important to demonstrate and promote a sound understanding of a proper exposure assessment focus.

Section 8.3.5, Exposure Point Concentrations, page 8-9. The second paragraph states, "release and transport of contaminants in environmental media may be modeled using basic analytical methods recommended by EPA or the best model available as determined by a model performance evaluation. The models will be calibrated to improve performance using site-specific parameters". The text needs to provide a discussion of the methods.

Section 9.2.2.1, Collect and Evaluate Existing Site Data and Information, page 9-17. The text states that information from studies conducted at Rocky Flats on radionuclide uptake, retention, and effects on plant and animal populations will be used as some of the base information for the site. However, a citation is not provided for those studies. References should be provided for all studies used for basic information.

Section 9.2.3.1, Air Quality, page 9-21. The workplan identifies the site-wide air quality monitoring program as an important source of information for the environmental evaluation. However, descriptions of this type of study have been consistently missing from the Rocky Flats RI workplans. Furthermore, SOPs for the collection of air quality data during field investigations have not been approved. A description of the monitoring program and its anticipated data should be provided.

Section 9.2.3.1, Soils, page 15. The text states that surficial soils are a potential source of contaminant ingestion to "soil dwelling animals and invertebrates and their predators." The groups under discussion are not clear since, presumably, they are all animals. The statement should be clarified.

Section 9.3.2, Objectives, page 9-36. The text states the data quality objectives (DQOs) for the environmental evaluations have not been developed. DQO development should be one of the first steps in the plan, including an evaluation of the reasons for collecting samples and uses of the resulting data.

Section 9.3.3.1, Collection Methods, page 9-38. The text states that quantitative vegetation surveys will only be conducted for production. The general discussion on page 9-37, however, includes cover and height as vegetation parameters to be measured. The text should be clarified and made consistent.

Section 9.3.3.1, Sampling Intensity, page 9-40. The text states that live-trapping of small mammals will be done in the spring and fall providing the population will support that intensity. The methods to determine whether the population can survive sampling stress should be described.